



Product and Process Innovation supported by Risk assessment, Life cycle costing and Life cycle assessment

Markert, Frank; Duijm, Nijs Jan

Publication date:
2012

[Link back to DTU Orbit](#)

Citation (APA):

Markert, F., & Duijm, N. J. (2012). *Product and Process Innovation supported by Risk assessment, Life cycle costing and Life cycle assessment*. Poster session presented at Industrial technologies 2012: integrating nano, materials and production, Aarhus, Denmark. <http://industrialtechnologies2012.eu/>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Product & Process Innovation supported by Risk assessment, Life cycle costing and Life cycle assessment

Frank Markert¹, Nijs Jan Duijm

¹DTU Management, Technical University of Denmark, Dk-2800 Kongens Lyngby, Produktionstorvet 424, fram@dtu.dk

WHAT is the purpose of PlasmaNice ?

The aim of PlasmaNice¹ is to develop an innovative packaging material which preserves the product quality and is made of renewable resources or fossil-based materials with an improved recyclability.

The PlasmaNice project aims at developing machinery and processes able to create innovative coatings on different materials (plastic, cardboard and paper) through the combination of a process of chemical nanotechnology (sol-gel chemistry) and plasma technology, in other words the plasma deposition of nano coatings as small as 5-50 nm. PlasmaNice is funded by the European Union under the seventh RTD Framework Programme.

1) Atmospheric Plasmas for Nanoscale Industrial Surface Processing. For further information, see <http://hlab.ee.tut.fi/plasmanice/home>

WHY is this support included ?

Risk Assessment and Life Cycle Assessment & Costing are used as design tools to assess costs, environmental impacts, health and safety aspects of the new technologies and of the products to be developed.

A new process and technology should not provide a higher risk to workers and the society compared to established processes and products. Safety needs to be evaluated in terms of occupational safety, human health, and environmental exposure.

New products need to be safe for consumers and harmless to the environment. Any environmental exposure needs to be monitored to prevent damages. Transport and waste treatment of the coating materials and final products should be managed. Different scientific studies advise using Risk Assessment and Life Cycle Assessment to support decision making on nanotechnology.

Methods

Various commonly used methods including Risk Assessment and Life Cycle Assessments have been applied as e.g. FMEA, HazOp, Consequence calculations, standard databases as well as Precautionary Matrix to assess safety, health and environmental impacts of nanomaterials.

Using a life cycle approach as shown in Fig. 1 a holistic assessment of the technology is possible. Detailed process analysis using FMEA and HazOp have been done on the paper coating pilot equipment shown in Fig. 2

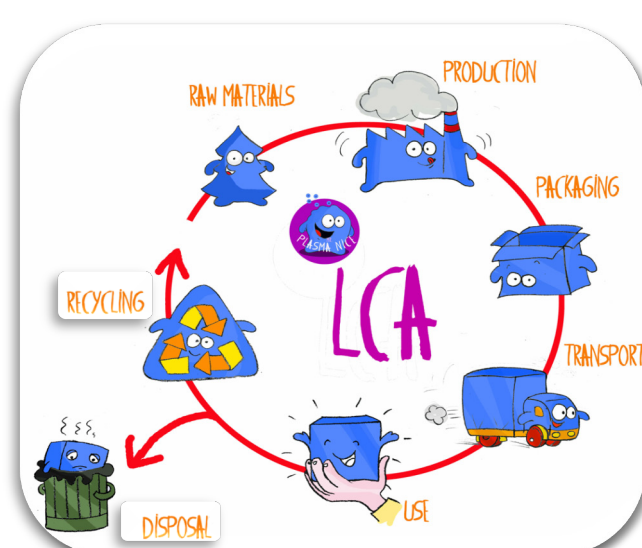


Fig. 1 General life cycle

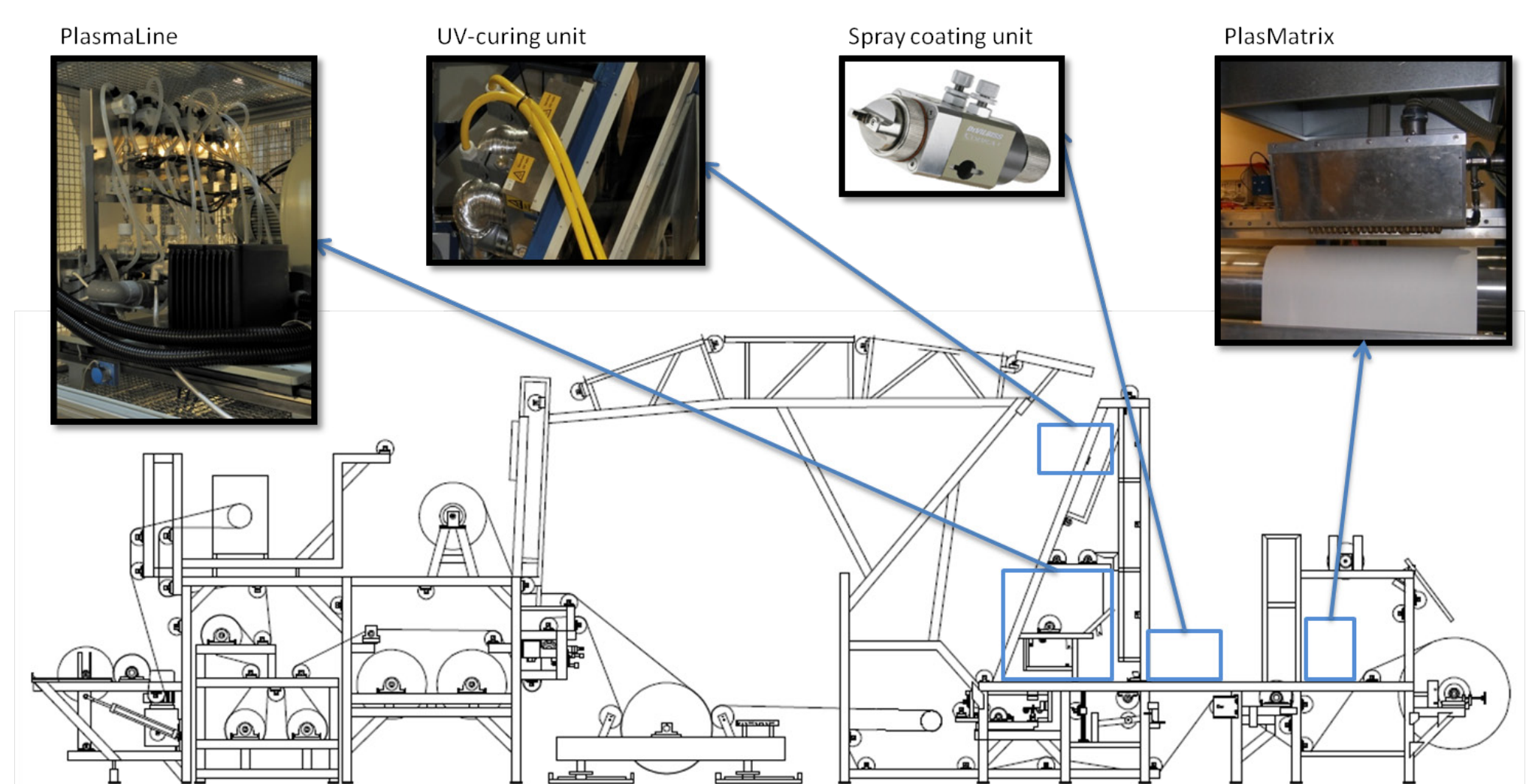


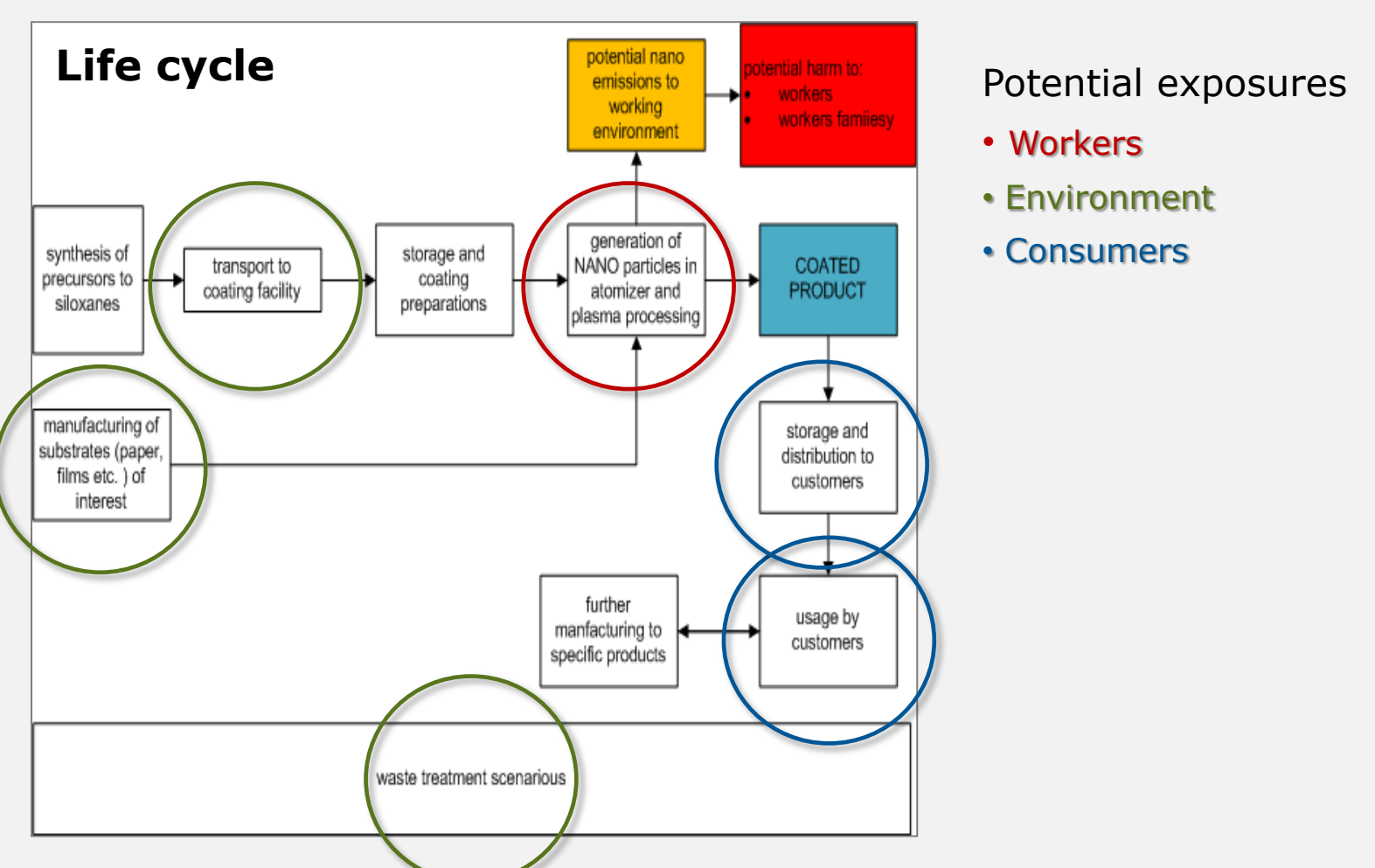
Fig. 2 Pilot coating line

Results

The sustainability of the overall process has been evaluated in a holistic perspective combining safety, environmental, health and cost assessments. The identified potential hazards are well known. They can be controlled in real industrial scale production by using state-of-the-art safety measures.

The perspectives of occupational health, consumer safety and waste treatment perspective have been assessed with focus on safe application of nanotechnology. Potential sources of exposure to nanoparticles have been identified:

- Occupational exposures: atomizers; plasma processing
- Environmental exposures: accidents/spills in manufacture; transport; waste treatment of coating material



Conclusions

The development of new coating materials for packaging has been supported using a holistic approach combining safety assessment, environmental evaluations using Life cycle analysis as well as a cost assessment. The methods and databases applied are commonly known and are widely acknowledged.

The methods together provide a holistic view on the sustainability of new material and process developments in a qualitative and quantitative way. By that these combination of methodologies provides a common basis to give feed back to the designers and for communication to all other stakeholders.